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Original research

Comparative study between Delorme operation with or without postanal repair and levateroplasty in treatment of complete rectal prolapse

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ABSTRACT

Background: Rectal prolapse is a distressing and socially disabling condition. controversy exists regarding the preferred surgical technique for the treatment of complete rectal prolapse.
Objective: We compared Delorme operation alone or with postanal repair and levatroplasty in treating complete rectal prolapse.
Methods: Consecutive patients treated for rectal prolapse at our colorectal unit were evaluated for inclusion. Participants were randomly allocated to receive Delorme operation only (GI), or Delorme operation with postanal repair and levatorplasty (GII).
Main outcome measures: The primary outcome measure was recurrence rate; secondary outcomes included improvement of constipation, incontinence, operative time, anal manometery and post-operative complications.
Results: Eighty-two consecutive patients with rectal prolapse were randomized. There was a significant difference between the two groups with longer operative time in group II. Recurrence rate after one year was (14.28% in GI, and 2.43% in GII, respectively ($P = 0.043$). Constipation improved in group I & II but there was a significant difference in constipation scores postoperatively between the two groups. There was improvement in continence mechanism in both groups postoperatively but being higher in group II and this produce a significant statistical difference (0.004). Mean satisfaction score was significantly higher in group II than group I. Both groups succeed to produce a significant change in resting and squeeze pressure before & after the operation.
Conclusions: Delorme operation seems to be an effective procedure for treating complete rectal prolapse especially if combined with postanal repair and levatorplasty.
Clinical trial registration: NCT01656369.

1. Introduction

Rectal prolapse frequently occurs in older women. The male-to-female ratio is 1:6 with a peak incidence between 50 and 60 years of age.[1] Patients usually present with obstructed defecation or fecal incontinence. Controversy still presents as regards the preferred surgical procedure for the treatment of rectal prolapse. The trans-abdominal procedure is generally considered by some authors more effective in healthy patients compared to perineal procedures.[2–5]

Yakut et al.[6] retrospectively reviewed their results for the Delorme procedure and for abdominal procedures performed for rectal prolapse and reported that in men, one of the most important complications was sexual dysfunction secondary to extensive pelvic dissection and posterior rectopexy procedures, leading to a recommendation of a perineal approach to rectal prolapse in young male patients. Interestingly, Oliver et al. found that a general improvement in continence after Delorme procedure, likely related to increased bulk provided by the plicated muscularis propria.[7]

Pescatori et al.[8] combined the Delorme procedure with sphincteroplasty in 33 patients successfully improving the continence of 70% of the patients and curing constipation in 44%. From a functional point, 50–75% of patients with rectal prolapse exhibit fecal incontinence.[9–13] This may be due to traumatic stretch injury to the sphincter complex, a finding that has been supported by endosonography.[14–16] Alternatively, continuous stimulation of the rectoanal inhibitory reflex by the prolapse leads to chronic low internal anal sphincter pressures.[17] Hence came the idea of our

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study is to compare Delorme operation alone or with postanal repair and levatorplasty for treating complete rectal prolapse.

2. Patients and methods

2.1. Patients

Consecutive patients, who were treated for complete rectal prolapse at the colorectal surgery unit of Mansoura University Hospital, Mansoura, Egypt, during the period from January 2007 to June 2011, were eligible for the study. Exclusion criteria include pregnant female, any patients with previous anal surgery, pudendal nerve neuropathy, anal fistula, and sepsis, age above 80 years, vascular disease, scleroderma, malnutrition, or coagulopathy.

Informed consent was obtained from all patients to be included in the study, after a careful explanation of the nature of the disease and possible treatment with its complications. The study was approved by the local ethics committee.

All patients were subjected to careful history taking, clinical examination, laboratory investigation, proctoscopic examination, and sigmoidoscopy. Anorectal physiology studies consisted of anal manometry and measurement of pudendal nerve terminal motor latency (PNTML) to exclude pudendal nerve entrapment syndrome.

A disposable St. Mark's electrode (Dantec, Scovlunde, Denmark) was used to evaluate PNTML according to the technique described by Kiff and Swash.[18] Pudendal neuropathy was considered when PNTML >2.3 ms.[19,20]

Conventional manometry was performed using a standard low compliance water perfusion system and eight-channel catheters with pressure transducer connected to 5.5 mm manometric probe with spirally located ports at 0.5-cm interval, which measures the pressure along the length of the anal canal. The protocol performance is stationed pull through technique with recording the functional length of the anal canal (FL), mean maximum resting pressure (MRP), and the mean maximum squeeze pressure (MSP). Pressures were recorded using a computerized recording device (Sandhill Bioview program, USA) which included menu-driven software to aid with data acquisition. Data were analyzed with the use of a complied software package that automatically produced numeric reports and graphs. At the end, each patient was asked to indicate the volume at which rectal sensation was first perceived.

Patients enrolled in the study were randomized into two groups using the closed envelope method. The envelopes were drawn and opened by a nurse not otherwise engaged in the study in the operating room. The patients were randomized into two groups: Group I: consisted of 41 patients were subjected to Delorme operation only. Group II: consisted of 41 patients were subjected to Delorme operation with postanal repair and levatorplasty.

2.2. Study procedure

Preoperative preparation was done by performing rectal enemas for cleaning of the colon. A prophylactic antibiotic in the form of third-generation cephalosporin was given 2 h preoperatively. The operation was performed with patients in the lithotomy position under general or spinal anesthesia.

2.3. Group 1: Delorme operation

The operation started by grasping the prolapse outside the anal canal. Adrenalized saline was injected in submucosal plain just above the dentate line to facilitate mucosal dissection. A circumferential incision was made in the rectal mucosa approximately 1 cm away from the dentate line. Using electrocautery, the mucosa was stripped to the apex of the prolapse. The muscular layers of the rectal wall were reduced as the mucosa was stripped. Mucosal stripping continued past the apex of the prolapse and then continued inside the prolapsed segment to a point internally that is equivalent to the point of the initial mucosal incision (Fig. 1). The underling muscle was plicated by vicryl 2/0. The muscle bite was taken longitudinally from

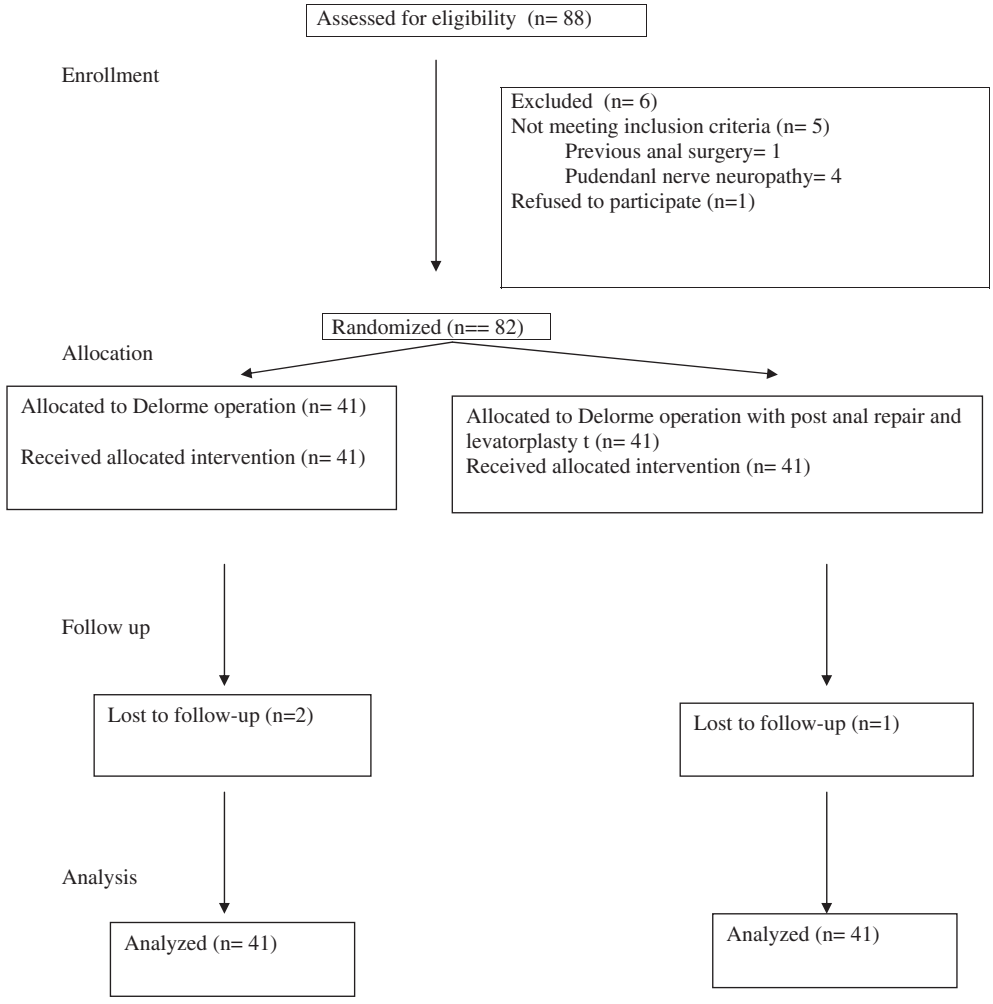

Fig. 1. Flow diagram of the progress through the phases of a randomized trial.

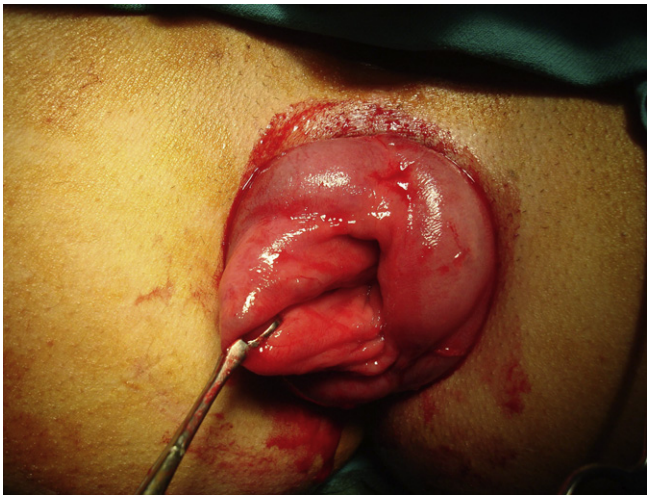

Fig. 2. Complete rectal prolapse.

eight sides to reach a horizontal line of plicaion at the end. The mucosa was then reanastomosed (Figs. 2–4).

2.4. Group II: Delorme operation with postanal repair and levatorplasty

Postanal repair was added by making incision 7 cm in length behind the anal canal. Dissection of intersphincteric plain, plication of internal sphincter by using 3/0 vicryl. The levator ani and external sphincter were then sutured to each other by vicryl 2/0 behind the anal canal followed by skin closure on drain (Figs. 5–9).

Patients were resumed normal oral feeding after recovery starting by fluids and semisolid on the same day. The patients were discharged after starting oral feeding and having healthy wound (no ischemia, ecchymoses or sepsis). After discharge, a high-fiber diet with bulk laxatives and oral antibiotic coverage in the form of oral metronidazole and third-generation cephalosporin were recommended.

Follow-up was conducted one week postoperatively, 3 months, 6 months, and then after one year. Patients were also seen at outpatient clinics if they developed symptoms between their follow-up visits.

3. Assessments

All assessments were conducted by investigators who were blinded to the experimental condition. The primary outcome was postoperative recurrence rate after one year. A recurrence was defined as full-thickness protrusion of the neorectal bowel wall. All recurrences were confirmed by physical examination by the attending staff surgeon and documented in the clinic charts. Secondary outcomes were improvement of constipation, incontinence rate, operative time, length of postoperative stay, postoperative anal manometry one year after the procedure, complications (bleeding, hematoma, infection, disruption, stricture), and patient's satisfaction (assessed by a visual analogue scale (VAS)).

The standardized Wexner constipation score was used to investigate the level of constipation before and after the operation.[21] The Pescatori classification was used to grade fecal incontinence.[22] Constipation in our study was defined as less than three bowel movements a week, difficulty emptying requiring straining, or dependent use of laxatives or enemas.

Statistical analysis of the data in this study was performed using SPSS software, version 17. Analysis of data was by intension-to-treat. For continuous variables, descriptive statistics were calculated and were described as mean ± standard deviation (SD). Categorical variables were reported using percentages. Student's *t*-test for paired samples was used to detect differences in the means of continuous variables and Chi-square test was used for categorical variables. *P* values <0.05 were considered to be significant. Significance was two tailed.

4. Results

4.1. Patients' characteristics

The study flow chart is shown in Fig. 1. Of 88 consecutive patients seen during the study period, 82 patients (51 women and 31 men) were eligible and included in the study. The mean age was 40 ± 6.5 years (16–64 years).

Preoperative symptoms included rectal prolapse in 82 patients, incontinence in 43 patients, constipation in 33 patients, rectal bleeding in 25 patients and pruritus ani in 12 patients.

The characteristics of the two randomized groups are presented in Table 1.

4.2. Clinical assessments

A significant difference between both groups was observed regarding operative time ($P = 0.001$), with Delorme operation alone taking the least amount of time. There was no significant difference between both groups in postoperative hospital stay.

Resolution of symptoms was achieved significantly after both procedures, constipation improved in both groups but there was a significant improvement in constipation scores postoperatively after Group II.

After the two procedures, there was an observed increase in number of continent patients in both groups at 1 year after surgery. The number of continent patients was significantly higher in

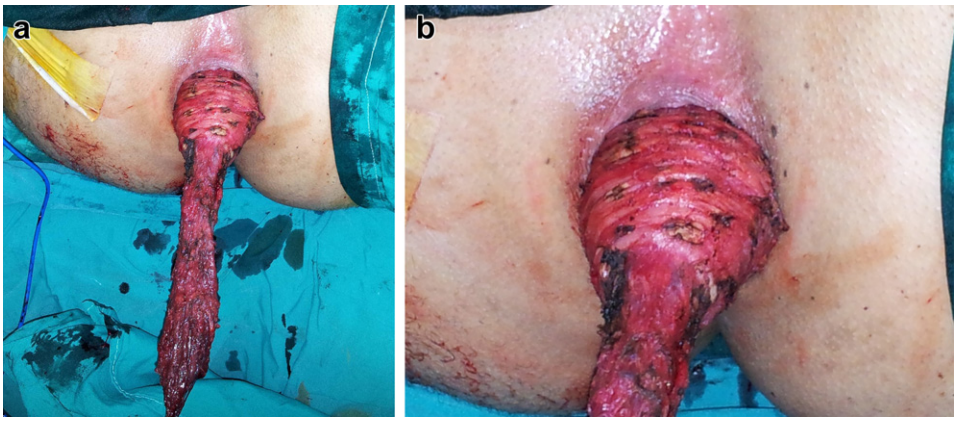

Fig. 3. (a, b) Mucosal tube after dissection of mucosa from underlying rectal ms.

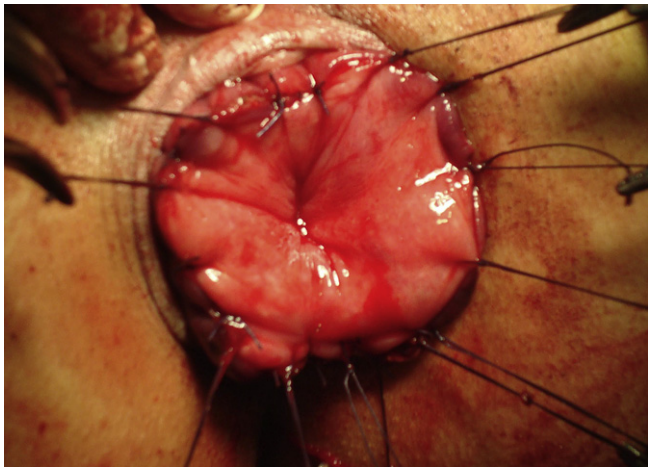

Fig. 4. Mucosal anastomosis after plication of underlying rectal muscle.

Delorme's operation combined with sphincteroplasty (97.56%) in comparison with Delorme operation alone (70.73%) and this produce a significant statistical difference ($P = 0.004$) (Table 2).

Patients' satisfaction rate after 1 year differed significantly between the two groups (Table 2). Both groups also showed significant differences in satisfaction on VAS, with the highest scores in the Delorme operation with postanal repair and levatorplasty group (6.53 ± 1.32 vs 8.04 ± 0.92, $P = 0.0001$).

Recurrence rate was significantly higher in Delorme operation alone (14.28%) than in the Delorme operation with postanal repair and levatorplasty group (2.43%) as seen in Table 2.

Postoperative anal bleeding occurred in two patients after Delorme operation and another one in Delorme operation with postanal repair and levatorplasty and was managed conservatively with antibiotics and dressings.

Rectal stricture occurred in one patient after Delorme operation with postanal repair and levatorplasty. This case managed by repeated anal dilatation and there was a good response. Partial disruption occurred in one patient after Delorme operation with postanal repair and levatorplasty. This case was managed conservatively with antibiotics and complete healing was achieved within 3 months.

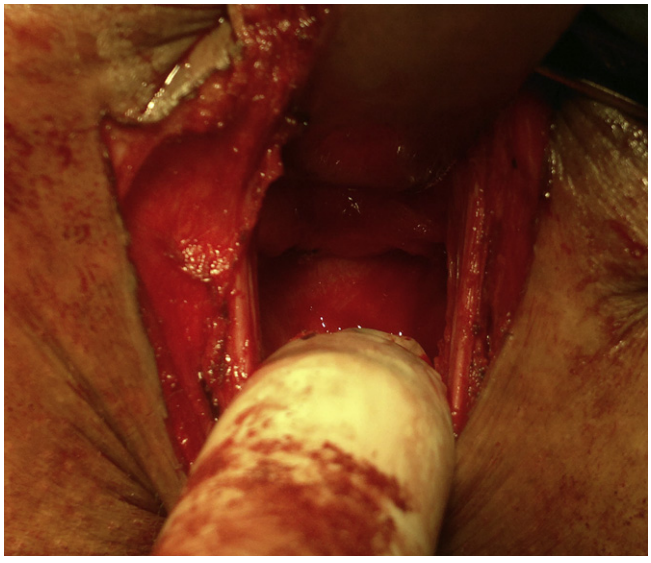

Fig. 5. Intersphincteric plain.

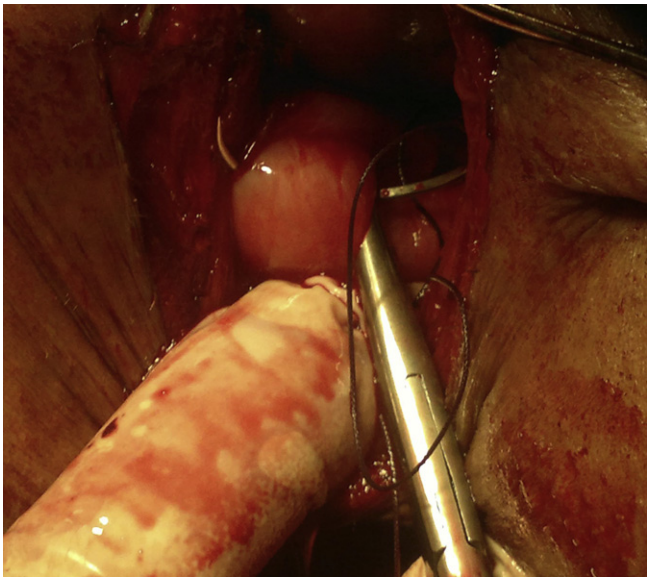

Fig. 6. One sling of the levator ani.

4.3. Manometric study

No significant difference in the mean resting anal pressure or squeeze pressure was observed between the two groups preoperatively. However, after the procedures, significant differences in the anal pressures (mean and squeeze) were observed between the two groups at 1 year after surgery (Table 3). The greatest improvement in the mean anal pressure was observed with the group II. Rectal sensation was improved significantly after the operation in both groups.

5. Discussion

Rectal prolapse is a distressing and socially disabling condition. A complete rectal prolapse is an intussusception that extends beyond the anus. Symptoms include mucus discharge, rectal bleeding, pruritus ani, tenesmus, obstructed defection, and incontinence. Its cause is still not completely understood.[24] When selecting the operative procedure for complete rectal prolapse, surgeons should put in mind recurrence rate, acceptable morbidity and mortality rates, the possibility for restoration of continence, and overcome of constipation. In addition, patient's quality of life

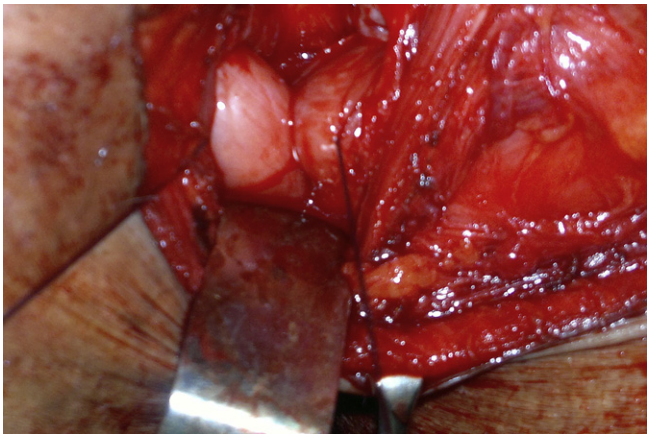

Fig. 7. Both slings of levator during levatorplasty.

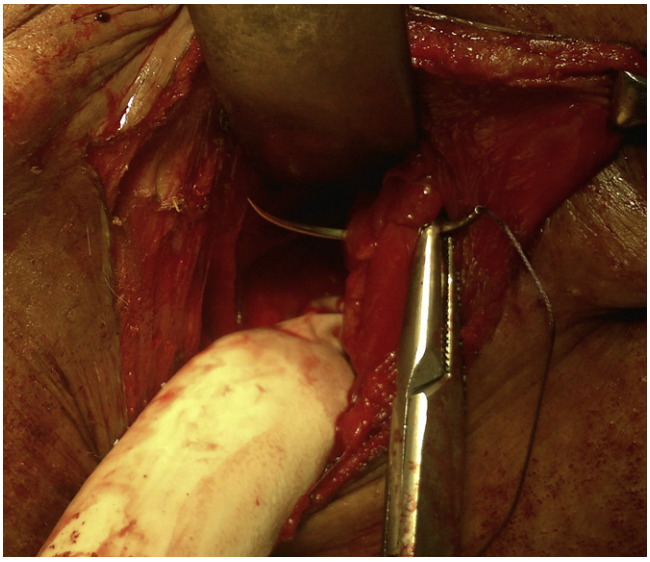

Fig. 8. External sphincter plication.

must be taken into account as well. Edmond Delorme,[23] a French military surgeon, first described a mucosal stripping procedure for rectal prolapse in 1899. Many surgeons have since modified the procedure.[24]

Many surgeons have suggested that perineal operations are inadequate for young, medically fit patients because these procedures are fraught with higher incidence of recurrence rates than abdominal procedures.[13] In part, these arguments are founded on the expectation that over time the recurrence rate for perineal repairs will continue to increase. However, this is not a phenomenon limited to perineal repairs. Marceau et al.[25] have reported progressively increasing recurrence rates over time, specifically in younger patients undergoing abdominal repairs. Raftopoulos et al.[26] found that the recurrence rates of 1%, 6.6%, and 29% at 1 year, 5 years, and 10 years, respectively, occurred after abdominal repair.

Many authors reported that Delorme repair had a high recurrence rates, high complication rates, poor anatomic and functional outcomes, and lack of sufficient data regarding the durability of the Delorme repair have kept it from being universally accepted as the

Fig. 9. Skin suturing after postanal repair.

Table 1
Demographic and preoperative data.

Variables	Group 1	Group 2	*P* value
	Delorme	Delorme with sphincteric repair	
Age (years)	41.92 ± 9.04 (17–64)	39.21 ± 10.39 (16–61)	0.21
Sex (male/female)	15/26	16/25	0.82
Duration of symptoms	49.56 ± 16.01 (19–84)	50.58 ± 19.95 (18–84)	0.79
Constipation	17 (41.5%)	16 (39.02%)	0.82
Constipation score	14.26 ± 4.31 (9–21)	14.34 ± 4.57 (8–22)	0.94
Fully continent	20 (48.78%)	19 (46.34%)	0.94
Incontinence	21 (51.22%)	22 (53.66%)	
A1	16 (39.02%)	16 (39.02%)	
A2	5 (12.19%)	6 (14.63%)	
Patients satisfaction	4.65 ± 1.21 (2–6)	4.6 ± 1.3 (2–6)	0.86

Data are means SD with ranges in parentheses or numbers of patients with percentage in parentheses.

initial treatment for rectal prolapsed.[27,28] The recurrence rates after abdominal procedures for rectal prolapse most often are less than 10% and generally are 5% or less. The recurrence rates after Delorme operation are widely variable, but most large series reported that the recurrence rates of 7–25%.[8,29,30]

Lechaux et al.[28] found that the recurrence rate was 5% in younger patients with good pelvic floor musculature, whereas the recurrence rate was 21% in elderly patients with a weak pelvic floor. In our study, recurrence rate occurred in six patients in Group I (14.28%) in contrast to one patient in Group II (2.43%). The low recurrence rate in our series may be related to relative short period of follow-up, better selection of patients in the form of relative younger age with exclusion of patients with pudendal neuropathy. Also sphincteroplasty play an essential role in reducing recurrence rate from 14.28% to 2.43% without significantly

Table 2
Clinical outcome after surgery for rectal prolapse.

Variables	Group 1	Group 2	*P* value
	Delorme	Delorme with sphincteric repair	
Operative time (min)	124.14 ± 13.7 (95–150)	153.48 ± 17 (120–200)	0.0001
Hospital stay	1.36 ± 0.48 (1–2)	1.39 ± 0.49 (1–2)	0.82
Complications			
Bleeding	2 (2.88|%)	1 (2.43%)	0.55
Stricture	0	1 (2.43%)	0.31
Disruption	0	1 (2.43%)	0.31
Constipation			
Number of patients	9 (21.95%)	6 (14.63%)	0.39
Constipation score	12.6 ± 3.33 (9–19)	9 ± 3.09 (7–18)	0.0001
Incontinence			
Number of continent patients	29 (70.73%)	40 (97.56%)	0.004
Grade of incontinence			
A1	11 (26.83%)	1 (2.43%)	
A2	1 (2.43%)	0	
Mean satisfaction score (VAS)	6.53 ± 1.32 (4–9)	8.04 ± 0.92 (5–9)	0.0001
Recurrence	6 (14.28%)	1 (2.43%)	0.048

Data are means SD with ranges in parentheses or numbers of patients with percentage in parentheses.

Table 3
Manometeric changes before and one year after surgery for rectal prolapse.

Variables	Group 1	Group 2	*P* value
	Delorme	Delorme with sphincteric repair	
MRAP(mm Hg)			
Preoperative	44.5 ± 11.2 (31–75)	41.92 ± 11.9 (31–68)	0.3
Postoperative	55.2 ± 6 (45–75)	63.78 ± 3.9 (51–75)	0.0001
*P** values	0.0001	0.0001	
MSAP (mm Hg)			
Preoperative	83 ± 4.6 (74–92)	81.5 ± 3.7 (73–92)	0.18
Postoperative	89.4 ± 5.3 (81–102)	95.7 ± 5.5 (84–112)	0.0001
*P** values	0.0001	0.0001	
Rectal sensation (ml/l)			
Preoperative	60.7 ± 6.5 (55–75)	58.7 ± 7.1 (45–75)	0.17
Postoperative	40.6 ± 7.7 (20–55)	30.4 ± 6.4 (20–45)	0.0001
*P** values	0.0001	0.0001	

MRAP, maximum resting pressure; MSAP, maximum squeeze pressure.
Data are means SD with ranges in parentheses.

increasing mortality, morbidity or hospital stay. This result goes with Lieberth et al.,[31] who reported a recurrence rate of 8% in young patients treated by Delorme. Also with Tsunoda et al.,[32] who found that Delorme's procedure has good results in younger patients. In elderly patients, 80 years or older, results were disappointing with a 33% recurrence rate. Our results does not match with Riansuwan et al.,[33] who reported that, the high recurrence rates make the perineal operation a second-best choice for younger, healthy patients. Recent studies,[24,27,34–37] including ours, found that the procedure can be performed with low recurrence rates, low morbidity, and almost no mortality when associated with levatorplasty. Our results accord with Elgadaa et al.[37] who reported a recurrence rate of 10% after combination of Delorme's procedure with postanal repair in the treatment of complete rectal prolapse and concluded that it is a safe procedure that corrects the anatomical defects and improves the functional outcome.

Fecal incontinence is another functional problem that may persist postoperatively. Sphincter function has been shown to recover with time postoperatively owing to recovery of the internal or both internal and external anal sphincters.[38] The addition of postanal repair to Delorme's operation has been shown to significantly improve functional outcome. It significantly increases the length of the high-pressure zone and high resting pressure.[39] Our results showed significant clinical improvement in continence mechanism in patients treated with Delorme's and postanal repair (97.5%) in contrast to patients treated by Delorme's operation alone (70.7%). Functionally, there was a significant improvement in anal sphincter function and rectal sensation in both groups.

These results goes with Pescatori et al.,[8] who reported improvement in continence in 70% of their cases after Delorme's operation and sphincteroplasty, with an increase in voluntary contraction at anal manometry. Elgadaa et al.[37] stated a better improvement in incontinence, which occurred in 73.3% (11/15) after Delorme's operation combined with postanal repair and attributed the failure to improve incontinence in four of patients in their series to pudendal neuropathy. This may also explain the higher rate of improving continence mechanism in our series. Tsunoda et al.,[32] reported that the incontinence improved in 63% of patients after Delorme's operation. There was a significant postoperative improvement in maximum resting pressure (MRP), maximum squeeze pressure (MSP) and significant decrease in the volume at which rectal sensation was first perceived.

Delorme's procedure has been used as a treatment for constipation.[40] The effect seems to be one of the advantages of Delorme's compared with abdominal procedure, for which constipation has been reported as a serious problem,[27] possibly owing to complete division of lateral rectal ligament.[40,41] Rectal mucosectomy may also have an important effect on proximal colonic motility with more frequent rectal filling.[42] The Delorme plication results in reduced rectal compliance and improved rectal sensation.[42,43] Chronic constipation and fecal incontinence still persist to a certain extent in some patients following abdominal operation of rectal prolapsed.[44,45] In our series the number of constipated patients have been reduced from 17 (41.5%) to 9 (21.95%) patients after Delorme operation and from 16 (39.02%) to 6 (14.63%) patients after Delorme's procedure with sphincteroplasty. Many authors reported that Delorme's procedure reduced incidence of defecatory problems.[8,32,37,42,46]

Kariv et al.[47] reported that Although laparoscopic repair (LR) has shortened the hospital stay, lessened the pain of the perioperative period, and decreased the recovery time than open repair (OR), but has not changed the complications associated with rectopexy ± resection for rectal prolapse. The rates for recurrence requiring surgery were 9.3% for LR and 4.7% for OR ($p = 0.39$), during follow-up period of 59 months. The postoperative incontinence rates were 30% for LR and 33% for OR ($p = 0.83$). By avoiding a peritoneal cavity approach to repair of the prolapse, the risks common to all abdominopelvic dissections were minimized and specifically the risk to reproductive function was particularly limited. Neither the presacral nor the lateral pelvic plexuses were exposed in the course of the Delorme procedure. In addition, for those undergoing resection, both the risk of full-thickness anastomotic leak and the discomfort of a specimen extraction wound could be avoided.[31]

6. Conclusions

Delorme's operation seems to be an effective procedure for treating complete rectal prolapse especially if combined with postanal repair and levateroplasty.

Author contributions

Mohamed Youssef, Ayman El Nakeeb, Waleed Thabet and Mohamed Farid designed research.

Emad Abd Alla, Mohamed Youssef, Mahmoud Abd El Nabeey, El Yamani Fouda and Waleed Omar performed research.

Mohamed Youssef, Ayman El Nakeeb and Mahmoud Abd El Nabeey analyzed data.

Mohamed Youssef and Ayman El Nakeeb wrote the paper.

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